

The Berner-Garde Foundation

**Established to
Understand and Reduce
Genetic Disease
in
Bernese Mountain Dogs**



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What is my future?



Photo courtesy 'Anne Nichols, Photography'

If the mission of the Berner-Garde is fulfilled, owners of dogs like this one can count on the answer being "a long and healthy life".

This can only be accomplished if the occurrence of several serious hereditary diseases can be decreased. To do this, evaluation of **every dog that is born is important**, whether or not it will ever be allowed to reproduce.

There has to be some way to predict the package of genes each dog carries, both the ones that are obvious in each dog (phenotype) and the ones that are not obvious but are carried and can show up in later generations (genotype). This is done by reviewing the phenotypes of as many relatives as possible; a formula can then be applied to give a prediction of the genotype that an individual will pass on to its offspring (progeny).

The Berner-Garde Foundation makes this possible by:

- education
- maintaining a specially programmed computer database
- actively soliciting data from the owners of every purebred BMD
- allowing breeders to choose mates based on documented information on various traits
- receiving gifts to honor the living or to remember deceased Berners and their folk.

What is the BERNER-GARDE?

The BERNER-GARDE is a foundation set up to facilitate the orderly acquisition and dissemination of information related to genetic traits in Bernese Mountain Dogs (Berner Sennenhund, BMD, Bouvier de Bernois) and to provide for the perpetuity of the database initiated by the San Francisco Bay Berners (SFBB). The Foundation will apply for tax exempt status.

The Governing Board consists of nine persons, three of whom have been nominated by the Bernese Mountain Dog Club of America's Board and are current or former Board members. At this time, the Berner-Garde Board consists of Teresa Glenn-Godfrey (CA), Lori Jodar (MI), Stephanie Merchant (NV), Susan Muick-Giagarra (CT), Barbara Packard (CA), Roger Pearson (WA), Anne Simonson (CA), Nancy Stewart (AZ), and Patricia Tackett (TX). Martin Packard (CA) is the File Manager and Phillip Shaffer (CO) is the Assistant File Manager.

A Scientific Advisory Committee comprised of experts in various fields of veterinary science will be appointed by the Governing Board.

The BERNER-GARDE Foundation was established to help breeders reduce genetic disease while breeding for good temperament and type. The Foundation is dedicated to educating and sharing accurate information about genetic disease, using the data collected in the BERNER-GARDE Database. Access to information in the database is available to all owners and clubs of Bernese Mountain Dogs both national and international, approved researchers, and other appropriate users. This database model is available to other breed groups who want to share data in an open manner which reveals the problem traits as well as the desirable traits of a breed.

The benefits of this Foundation can be measured in both short and long range terms. There is an immediate benefit for breeders who use the information. In the long run, everyone who will own a Berner will benefit. The Foundation enables all Bernese Mountain Dog (BMD) lovers to share knowledge and to progress together.

Breeders can play an important role in determining the genetic mode of inheritance of diseases. All Berner owners and lovers can do something to reduce the incidence of genetic disease. Positive steps can be taken now to alleviate the pain, expense, and heartbreak these diseases cause.

Funding

Initial funds to publish this booklet were given in memory of their dogs by Michael Cooper (Molly Brown), Anne Gause (Kaefer), John/Monica Hudson (Sheppi), John/Lolly Menzies (Tasha), Charles/Garril Page (Krocket) and Sally Strine (Rika). The remainder came from numerous other donations. Future funding for the

BERNER-GARDE Foundation will come from gifts and fund-raising projects by friends of the breed. Memorial contributions are encouraged. The long range goal will be to establish an endowment for permanent protection of the breed.

Data requests will be charged a minimal fee to help defray the costs of maintaining the database programs and the data entry and dissemination.

Acknowledgements

The BERNER-GARDE Foundation expresses appreciation to:

- The many veterinarians, both domestic and overseas, who have contributed to the understanding of what is needed for control of genetic diseases;
- The hundreds of Berner owners who have submitted data for the development of the database, and those who will choose to submit information in the future;
- The founders of the West Highland Anomaly Task Council (W^{atch}) who generously agreed to permit the use of their prototype booklet, as first published in February, 1989,
- The San Francisco Bay Berners for their financial support of the development of the Foundation,
- The Bernese Mountain Dog Club of America for their endorsement of the database and their use of the data,
- The American Kennel Club and the overseas counterparts that have been publishing numerous articles which encourage breeders to address the control of genetic diseases in their dogs.

A Database Is

A database is a place to store and organize bits of information (data). A card file can be a database.

The Berner-Garde computer database is a collection of information that has been entered by a person into a computer. The computer has been programmed by using a purchased set of instructions which has been customized by Berner owners. The computer organizes and retrieves this data in almost unlimited ways of sorting at the direction of an operator. The computer can handle data with a volume and complexity that would be virtually impossible with only the human mind (which is in itself a remarkable database!).

How To Become A Part Of The BERNER-GARDE Database

Each owner will know that their breeder has entered their information in the database if they receive a blue proof-sheet after getting the puppy. If the breeder has not submitted litter data, the individual owner can report data directly to the database manager or to the regional site operator, by submitting the INDIVIDUAL FORM at the end of this booklet. The data can also be submitted by the owner of a rescue dog.

Each breeder fills out the LITTER FORM at the end of the booklet. This identifies every puppy that they produce and the person with whom the puppy has gone to live. A separate file is set up for each of these dogs and their owners and will be updated throughout the life of the dog as data is submitted by the owner. It will include such items as health records, adult measurements, registered name and number, achievements, whether it was ever bred or neutered, etc.

BMD breeders share a universal goal to breed better Berners: Berners that are winning dogs in the show ring; Berners that have good temperaments and make good companions with long, healthy lives; and Berners that are sound enough to do the work required of a Sennenhund.

There are existing forums for competition and evaluation of the first two qualities. Dog shows and their associated advertising promote dogs with above-average conformation. Obedience and working trials and satisfied pet owners speak for good temperament.

The BERNER-GARDE Foundation focuses on a third quality which involves the health and longevity necessary to achieve the expected 12 to 14 year lifespan for a dog of this size.

The database provides a tool to identify those good winners, companions, or workers which are also good breeding stock and which will improve the number of healthy dogs in the breed while maintaining good conformation, temperament and working ability.

Education and Data Collection

One of the responsibilities of the BERNER-GARDE Foundation is education. To carry out this responsibility, it is necessary to maintain an up-to-date, modern database and collect accurate data. When these data are shared with breeders, they will be able to make breeding decisions based on accurate information. For example a listing of the significant diseases with more than one entry in the database is given in the Appendix.

Cooperative Effort Needed

The objective of a genetic disease control program is to reduce the incidence of inherited disease in a kennel or the breed as a whole. Effective control of genetic disease requires that affected as well as unaffected individuals in litters of dogs be identified and recorded in a professional disease registry. The progress of a genetic disease control program can be measured by maintaining an accurate database of prevalence within the breed. Reporting these types of data can help to measure the progress of the breed as a whole. Improvements in the breed can be made more rapidly when the average for the breed is known.

Few persons can do it alone. Most breeders have small kennels and cannot afford or do not care to have a large breeding colony. Only by working with other breeders and sharing information can any long term control of genetic disease, on a breed-wide basis, be achieved.

Same Language and Methods

To speak the same language, those who wish to work together to reduce genetic disease in the breed need to agree on methods for evaluating dogs and on the terminology used to describe the findings. Professional registries that are established to record evaluations by experts for a particular disease will develop this terminology and methodology.

First-stage disease registries are those established by a group of owners/breeders seeking information for their personal use. Usually the information is unavailable to others. Current registries of this type are:

OVC (Ontario Veterinary College): Normal hip certifications are reported only to the owner. No evaluations are released to the public.

Second-stage disease registries are those that release only normal evaluations to the public. The owner agrees at the time of submission to release the record of their dog if it is normal. This type of registry aids in selection of a normal phenotype. (visible characteristics of an individual). Examples are:

OFA (Orthopedic Foundation for Animals): The first registry to exist to record hip evaluations. After several years, OFA released quarterly reports of normal evaluations only to national breed clubs on request. After public release of normals, one could choose to breed only to normal mates. This process is termed "mass selection" (breed normal phenotype to normal phenotype) and does work slowly towards improvement. Since the majority of BMDs are not evaluated by the OFA, it is not possible to use the OFA data to identify the extent of 'carrier risk' that a particular dog has, nor is it possible to establish what is the average for the breed and make choices which will improve the average.

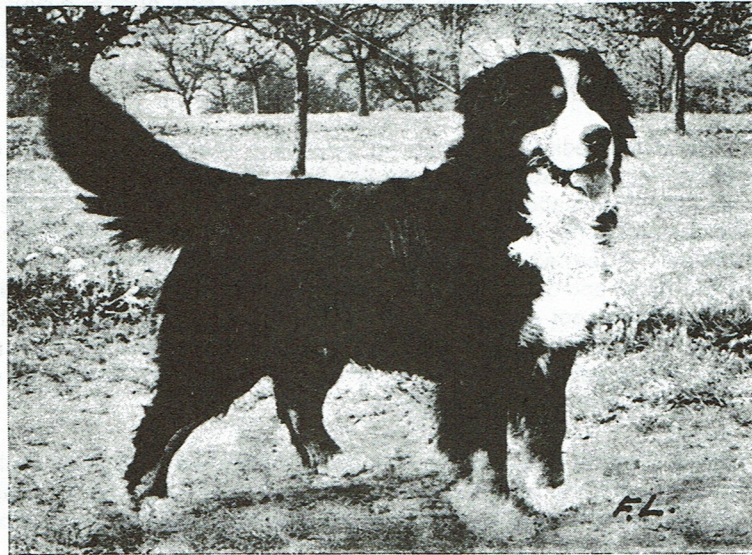
CERF (Canine Eye Registry Foundation): Founded to register evaluations of eyes. Normal evaluations are given a cleared rating on a certain date, after which they must be repeated; the current normals list may be released publicly.

Third-stage registries which are "open" were first used with success in Norway and Sweden. In this type all information is available to the public and aids in selection of mates whose bloodlines indicate the most normal genotype (reproducing

characteristics). These registries have served as the model for the Institute for Genetic Disease Control in Animals (GDC).

The GDC, founded in June of 1990, is the first registry of this type in the USA. The GDC is a registry which records expert evaluations for genetic diseases of soft tissue as well as joints. Owners agree at time of submission that all data on their dog may be released. The normal certifications are released for the BERNER-GARDE database. An individual can ask for reports about other dogs and their relatives that are normal or affected. This forms a genetic history which is available to owners (potential breeders), veterinarians, and scientists who want to trace the genetic history of a dog. In order to control the increasing presence of genetic diseases (such as those of the major joints, or eyes, or heart, etc.), one must know how prevalent such diseases are in the breed and in any particular dog's bloodlines.

Registering both normal and affected reports for EVERY dog is important. The purpose of an open registry is to help breeders and owners reduce the presence of genetic diseases in their breed as rapidly as possible. In order to be effective, the registry must record data on as large a group of animals as possible, both normal and affected. To encourage this, the GDC does not charge for affected evaluations. The evaluation of every single dog, whether pet or working dog, increases the ability to accurately predict the risk in a bloodline being considered for breeding.



"Alex v Angstorf"

What you see in the normal phenotype does not assure a normal genotype.

The Modern Way---Think Litters

- The Basic Data For Genetic Disease Control
depends on accurate information from EVERY breeder at the birth of EVERY litter: the correct birthdate, parents, the number and sex of siblings, and the identification of the new owners of each puppy.
- Data Collection After the Puppy Leaves the Breeder
depends upon the accurate information from the owner of EACH puppy as it matures and ages.
- BMD Regional Groups Have A Key Position
as intermediaries between the individual and the BERNER-GARDE Foundation for collecting the needed data on the dogs within their neighborhood and transferring it to the BERNER-GARDE Database. The File Manager is available to help establish a compatible regional data site.
- To "Think Litter", Breeders Must Keep In Touch
with their litter(s) so they don't lose contact with the owners, including those who do not want to *show* or *belong* to a club. What happens to each dog contributes to the knowledge of the health of the breed-as-a-whole, whether or not the dog participates in activities or is ever bred.



Photo courtesy of Bev Burney.

Genetic Risk Counseling

When data is available for a sufficiently large family of dogs, a breeder can evaluate the risk for genetic disease transmission by a dog from that family. The Berner-Garde does not provide for genetic risk counseling. This risk counseling can be sought from qualified experts in the field.

Members of the governing board of the BERNER-GARDE Foundation are available to help interpret information and share their knowledge of the mechanics of the database. Return phone calls will be made collect.

Test Matings for Single Gene Traits

The majority of genetic diseases are single gene traits.

The Westie Watch has developed criteria and methods (which can be used for all breeds) to perform scientifically correct test matings which provide accurate information on simple recessive genetic anomalies. These traits are influenced by a single gene site and are the traits that will be:

- observable on the average in 25% of the pups in a litter if both parents were 'carriers',
- passed on as carriers without symptoms on the average in another 50% of the pups and,
- avoided on the average by 25% of the pups which receive the 'normal' part of the gene package from both parents and will not be carriers.

Dr. George Padgett, Michigan State University consultant, reminds us that all breedings are test matings if appropriate records are kept and are available to the public. The BERNER-GARDE database is designed for such a use.

Polygenic Risk Assessment

Reducing polygenic (multigene) disease is more complicated and relies upon the guidance of an expert to assess the genetic risks for an individual animal. These are the traits that are influenced by multiple gene sites and will be expressed only when all of the chromosomes at those sites are combined in a particular way to produce the observable trait in the offspring.

The BERNER-GARDE database is designed to provide data for this counseling service when data for sufficient numbers of relatives are in the file. Many more dogs can have these genes without our being able to identify them than in simple single gene traits.

Until the polygenic sites can be identified, one must rely upon the identification of the amount of 'risk' of being a carrier that each dog has. This is done by evaluating the appearance of the particular trait in all litters of the full and half siblings (brothers/sisters) as well as of the aunts and uncles of a particular dog.

Current research will lead to identification of DNA probes which will become additional tools for use in the future.

BERNER-GARDE Foundation Database

The database began with the phenotype files developed and maintained by the San Francisco Bay Berners (SFBB) since 1974 (first maintained on SAS, then dBaselII, and now on dBaselV). It contains all of the normal certifications from the GDC and OFA registries for both hips and elbows. It also contains a variety of anecdotal data reported by BMD owners.

The database is a program for open collection and dissemination (sharing) of factual information on a breed-wide basis. The Database IV program makes it possible to handle relational files and a high percentage of cooperation by owners to submit the data on their dogs. The file is managed in a way to validate the accuracy of information that is submitted (Pg **) and to verify that information is released only to those persons who intend to use it for genetic disease control purposes.

Requests for data to study a disease will be considered by the Board of the BERNER-GARDE Foundation. Approval of recommendations for studies will be based on adequacy of recorded data, frequency of occurrence, the level of interest expressed by owners, the implications for possibility of a genetic basis, and agreement on accurate diagnostic methods for that disease.

Guidelines for Use

Data Sources: Data comes from both owners, professionally evaluated disease registries, and other published sources. The database contains information submitted informally on all anomalies. This means that the database will include some data that has not come from a formalized registry. Therefore, it includes:

1. diseases which have been proved to have a genetic base in the BMD, even if the mode of inheritance has not yet been identified, (i.e. bloat, ruptured cruciate ligament);
2. diseases which appear to have the possibility of a genetic base in the BMD;
3. diseases which have not yet been established to have a genetic base in the BMD or any other breed.

Entry of Data (No Charge)

All data submitted by individuals will be entered (see INDIVIDUAL FORM on page 36) and will become part of this open database. Other data will be entered from such sources as AKC monthly stud book registry, recognized disease registries, show catalogs, and Regional Group reports.

Verification of Accuracy (No Charge)

Proofing (checking for accuracy) of individual records is encouraged at any time and can be mailed from either the central database or one of the regional sites. The central file is expected to be the most current. Responsible persons using this database will promptly report documentable errors as they find them.

Access to the BERNER-GARDE Database

In general, data in the database is available to people who need support and information which will lead to a reduction of genetic diseases in a kennel or the breed as a whole. All information must be used in accordance with ethical breeding standards. All requests for information will be maintained in the file.

To minimize the chance that data is used in a competitive manner, access to files is by written request to the central Database Manager or Regional Site Operator. The request is maintained by the central database manager for future reference. Disease files developed for studies of a particular disease are not available to the public during the investigative stage.

Accuracy of Diagnostic Categories

In general, information will come from the breeder for accurate full-litter data; from the owner for developmental data (size, titles, behavior, health); from disease registries or local veterinarians for disease diagnosis. Information will be coded so users can evaluate the dependability of the source.

Three (3) categories of accuracy, D/A/H, have been defined:

- **D (Diagnosed):** The disease has been reported by a veterinary specialist or the breeder or owner has entered data as stated in the breed standard, (when the answer is not debatable), i.e. blue eye, over/under/even bite, missing markings, etc.
- **A (Anecdotal):** Entered with the owner, breeder or veterinarian's written statement, e.g. a tumor was palpated, seen on a radiograph or at surgery, but no tissue pathology was done; umbilical hernia; kink in tail, etc.
- **H (Hearsay):** Entered with a statement by a friend or someone who owns a related animal), for example someone reports a cause of death as fact, but does not own the dog. An attempt will be made to contact the owner of dogs in any Hearsay category for verification. The goal is to change as many H cases into Diagnosed cases as possible (retrospective) and to educate the owners as widely as possible to get a definitive Diagnosis at the time the

problem is identified (prospective). No hearsay information is released. It is verified only through the central file.

Examples:

Hips: Only reports from GDC or OFA or other 'country-registries' for hip evaluations are classified as D data. Other evaluations are A.

Elbows: GDC and other registries that use the International Protocol for evaluating are D category. Others are A.

Shoulders & Hocks: The GDC shoulder & hock registries are D category. All other reports are A.

Tumors: Reports of tumors or tumor-like growths from any Board certified pathologist are D. Slides that are sent to U.C. Davis for substantiation are D. If tumors are diagnosed by cytology, radiograph or palpation, they are usually Anecdotal.

Progressive Retinal Atrophy (PRA)/Cataracts: These are only entered if substantiated by Diagnostic report from a Diplomate of the Veterinary College of Ophthalmologists.

Psychomotor Seizure (Fly-snapping Syndrome): Primarily entered with owner Anecdote. Submission of videotapes to the diagnostician is useful to show the behavior. One case has been substantiated by recorded spiking in the electroencephalogram (EEG).

Example of other diseases and disorders reported primarily by owner Anecdotes: Gastric Dilatation & Torsion; Ruptured Cruciate Ligament; Entropion or Ectropion eyelid; Umbilical Hernia. It is recognized that since many of these cases have had surgical correction, it is preferable to get Documentation before releasing these reports, even though they are anecdotal from the owner.

Appendix

Diseases and Traits

This is a listing of diseases and traits with more than one entry in the BERNER-GARDE Database*. It includes some traits that may not be considered disease processes but occur often enough to warrant description. It does not prioritize the disagreeableness of each. It includes:

- diseases that are known to be hereditary and those suspected to be hereditary
- diseases and traits that have only been reported often enough to be of interest for record keeping at this time
- new diseases and traits will be added in response to questions from owners

The Merck Veterinary Manual, 7th edition, 1991 is the primary reference for these disease descriptions and of the format for listing the diseases by affected anatomical systems. Other important references are listed with the disease description.

Abbreviations for anatomical systems

BLC	Blood, Lymphatic and Cardiovascular Systems*
DIG	Digestive System*
END	Endocrine System
EE	Eye and Ear*
GEN	Generalized Conditions*
IMM	Immune System*
MET	Metabolic Disturbances
MUS	Musculoskeletal System*
NER	Nervous System*
PHY	Physical Influences
REP	Reproductive System
RES	Respiratory System
SKN	Skin
URN	Urinary System

* Examples from these systems have more than one entry in the Berner-Garde Database.

(BLC) Blood, Lymphatic & Cardiovascular Systems

BLC

(BLC) Aortic Stenosis

In dogs, stenosis (narrowing) of the outflow tract of the left ventricle is a fairly common congenital lesion. Usually, the valves are not primarily involved, but rather, the narrowing occurs below them as a fibrous ring (fibrous subaortic stenosis). Fainting and sudden death are not uncommon. Diagnosis is made by EKG or echocardiogram.

Treatment: Treatment with drugs can be helpful in controlling ventricular arrhythmias. Surgery is not generally done.

Mode of Inheritance: Probably polygenic. It has been reported chiefly in Boxers and German Shepherds, and has occurred in familial aggregations in these two breeds and in Newfoundlands as well as Golden Retrievers and multiple other breeds.

(BLC) Patent ductus arteriosus

Failure of the ductus arteriosus to close shortly after birth leads to an anomaly known as a patent (persistent) ductus arteriosus. It is one of the most common clinically recognized congenital cardiovascular anomalies of dogs and may be combined with other cardiac anomalies. The diagnosis is made by typical heart murmur. The anomaly may go unrecognized until the affected dog begins to show weakness or collapse on exercise owing to inadequate oxygen supply posteriorly.

Treatment: Surgery is recommended. However, right ventricular failure may follow when right-to-left shunt is present.

Mode of Inheritance: Polygenic in Miniature and Toy Poodles.

(BLC) Hemorrhage

Normally, bleeding results from external wounds or surgical trauma and responds in a predictable manner to treatment. Acute or chronic internal hemorrhage may occur spontaneously in hemostatic defects or result from surgery, wounds, tumors, abscesses and GI or urinary tract ulcers. There have been no cases of inherited bleeding disorders reported to the database. There have been several recorded cases of what appeared to be longer than expected post-surgery hemorrhage, including a report of a death as a result.

(DIG) Digestive System

DIG

(DIG) GASTRIC DILATATION (with or without torsion)

There is sudden onset of restlessness and anxiety with signs of discomfort, panting, increasing distention of the torso, may attempt to vomit unproductively. If torsion has occurred, insertion of a stomach tube to relieve the trapped gasses may not be possible. Diagnosis is usually made by clinical signs and confirmation is attempted by x-ray.

Treatment: Death is rapid without emergency relief of distention and correction of torsion by surgery with accompanying treatment for shock.

Mode of Inheritance: Unknown

(DIG) Exocrine Pancreatic Insufficiency

Pancreatic digestive enzyme production fails. As the disease progresses, there is weight loss, though the appetite remains ravenous. Rancid-smelling diarrhea occurs from loss of exocrine function. Severe disease may cause shock and collapse.

Treatment: The goal is to restore pancreatic function with diet and pharmaceuticals.

Mode of Inheritance: Unknown. EPI syndrome (exocrine pancreatic insufficiency) is hereditary in German Shepherds.

(DIG) Umbilical Hernia

The abdominal organs protrude through the umbilicus during the first month after birth. The size varies from what can only be felt as a small bubble under the skin to obvious protrusions the size of a thumb. The lump can be pushed back in to the abdominal cavity when it first occurs, may later become trapped outside of the abdominal wall.

Treatment: The normal healing of the umbilicus will correct small hernias by 4 months of age. The veterinarian will usually recommend that larger ones be surgically repaired between 4 to 6 months of age because of the dangers of necrosis from the restricted blood flow to the tissues which are protruding.

Some Swiss breeders feel responsible to have surgical repair done on the hernia before the puppy is delivered, in which case a buyer might not know that their puppy had been affected unless they specifically asked.

Mode of Inheritance: Unknown; recessive in Cocker.

(DIG) Liver Portosystemic Shunt

DIG

Congenital lesions (portosystemic vascular anomalies) may diminish hepatic blood flow causing compromised liver function. Also, there are other inherited or acquired changes in liver function which may be present without a shunt. Complex biochemical changes may cause a wide variety of clinical signs including neurobehavioral abnormalities. A variety of tests, which must be thoroughly understood for appropriate diagnostic and prognostic approaches, can be used to detect liver/bile disorders.

Treatment: Nutritional support and chemical treatment must be tailored to the individual. Surgical repair is nearly always required.

Mode of Inheritance: Polygenic in Cairn terriers.

(DIG) Hyperplasia of the gingiva (gum)

Normal gum tissue grows at an accelerated rate and may even cover several teeth.

Treatment: Electrosurgical techniques are used to remove the tissue if necessary.

Mode of Inheritance: Unknown. Familial gingival hypertrophy has been described among brachycephalic breeds (Pug, Pekingese, etc).

(DIG) Epulis (on the gum)

This is a tumor, usually localized to the area of one tooth. Histopathology should be used for distinguishing diagnosis.

Treatment: Surgical removal.

Mode of Inheritance: Not known to be inherited.

(DIG) Malocclusion: (other than full dentition with scissors bite)

DIG

An overbite condition occurs when the lower jaw is shorter than the upper jaw. When the jaw is closed, there is a space between the lower and the upper front teeth. This varies at 8 weeks old from 1/16-inch to 1/2-inch. When the canines erupt, the lower ones may become trapped within the upper teeth causing lesions on the roof of the mouth; the rear teeth do not pair up properly. With some degrees of this condition, the tongue tends to hang out more than usual; in severe cases, the muzzle takes on a very pointed look.

An underbite condition occurs when the lower jaw is longer than the upper jaw. The front lower teeth are forward of the upper teeth when the jaw is closed; the rest of the teeth do not pair up. With some degrees of this condition, the muzzle gives a "pug-face" appearance.

An even bite (pincer) exists when the upper incisors rest on top of the lower ones; it is called an irregular bite when one or more of the incisors are not in line with the others. In these cases, there may be space left between upper and lower rear teeth, so that during chewing, unusual stress is put on the edges of the front teeth where they pound together. Depending on the amount of space between the surfaces of the rear teeth, these dogs will commonly wear down the front teeth within five years; the severe cases will have the teeth worn to the gums.

Pre-molars may be missing on one or both sides. If the space is shortened between the remaining teeth, the mandible may be shortened.

Age of diagnosis: It has been noted that in the majority of cases, the occlusion that is observed at 8 weeks will be the same as that observed at maturity. However, there are a significant number of cases in which the lower jaw grows at a different rate than the upper, and the occlusion will be markedly different at 9 months when the growth plates close than it was at 8 weeks of age.

Mode of Inheritance: Unknown.

Ref: CANINE TERMINOLOGY, Harold Spira, Harper & Row, 1981.

(EE) EYE AND EAR

EE

(EE) Blue Eye(s)

Most commonly observed by 4 to 5 weeks of age. A few cases have been reported to be obvious when the eyes open. It occurs in one or both eyes, and occasionally with only half or a 'blue fleck' being reported. Anecdotal reports (not in the database) have implied a linkage with "too much" white in the coat markings

Mode of Inheritance: Unknown.

(EE) PRA (Progressive Retinal Atrophy)

First clinical sign is diminished sight at dusk and later, in daylight. There is gradual atrophy of retinal receptor cells and progressive reduction in size of the retinal blood vessels until finally the disc is white and the blood vessels disappear. The disease progresses over a period of months or years, always terminating in blindness.

Cases of blindness by 2 years of age as well as one case of blindness by 6 years of age have been diagnosed by certified ophthalmologists and registered with the GDC. Additional cases have been reported by CERF, but neither they nor the owners have released the information publicly. Electroretinography gives the most accurate evaluation for diagnosis.

Treatment: None successful.

Mode of Inheritance: Simple recessive in breeds that have been studied.

(EE) Cataracts (congenital, juvenile, senile)

Cataracts are an opacity of the lens and occur more often in dogs than other species. Lens opacities are accompanied by varying degrees of blindness. Both CERF and owners have verbally reported cases, but only one case has been registered with GDC (1/95).

Treatment: Congenital nuclear cataracts may reduce in size with the growth of the lens; juvenile cataracts may undergo sufficient resorption to regain sight. Surgery to remove the opaque lens in adults may be required to regain sight. Artificial lenses can be inserted.

Mode of Inheritance: Varies with breed studied.

EE

(EE) Ectropion/Entropion Eyelids

Both forms of eyelid abnormality show as 'reddened eyelids' or tearing. The ectropion lid is loose fitting and tends to collect particles which irritate the eye. The entropion is too tight and tends to curl in toward the eye, causing irritation which can even scratch the eye if the lashes are involved. In mild cases of entropion, the dog may relax the lid to prevent contact with the eye and this may be misinterpreted as being ectropion.

Treatment: In both forms, surgery is most often successful.

Mode of Inheritance: Unknown.

(EE) Prolapse of the Nictitans Gland) ("cherry eye")

The gland of the third eyelid protrudes as a pink fleshy mass above the third eyelid.

Treatment: Since it is a major tear gland, it should be preserved by surgery if necessary.

Mode of Inheritance: Unknown.

(END) ENDOCRINE

(END): Hypothyroidism

Hypothyroidism is the result of lack of circulating thyroid hormone. Thyroid hormone regulates the body's metabolic rate. Underactivity of the thyroid gland, often secondary to immune-mediated thyroiditis, is the cause of lack of thyroid hormone.

Hair loss, chronic skin or ear infections, heat-seeking behavior, lethargy and weight gain are typical signs. Reproductive function may be affected.

Treatment is by supplementation with thyroid hormone. Supplementation is safe and effective but does require lifelong medication.

Mode of Inheritance: Polygenic in Beagles, probably recessive in Borzois. Breed predisposition in Golden Retrievers, Dobermans, Great Danes, Irish Setters and many other breeds.

(GEN) TUMORS (Malignant and Benign)

GEN

Every anatomical system is affected by one or another kind of tumor in the Bernese Mountain Dog.

At the time of this publication, the BMD Tumor Registry contains over 500 histopathological reports of 47 different kinds of malignant and 29 different kinds of benign tumors. They are primarily connective tissue tumors, with a minority of endothelial tissue tumors. Description of the first of these to be proven hereditary in Bernese Mountain Dogs is below. Lymphosarcomas and fibrosarcomas do not demonstrate inheritance in BMD.

Histiocytosis (Malignant & Systemic)

This is a cancer of the histiocytes (macrophages) occurring in multiple organs and is rare except in the BMD where it is recorded as being the most common cancer type, with lymphosarcoma and mast cell tumors occurring next most frequently.

The age of onset varies widely with diagnosed cases occurring from 1 to 12 years of age, peaking from 5 to 8 years old.

Histiocytosis is usually characterized by rapid deterioration of general health. Lesions have been detected in a chest radiograph (without previous symptoms) or palpated in the abdomen.

This cancer type can only be confirmed by histopathological examination either by biopsy (while alive) or necropsy (after death). A needle aspiration may confirm malignancy, but not what kind.

Mode of inheritance: Polygenic in BMD.

Reference: JOURNAL OF SMALL ANIMAL PRACTICE, G. Padgett, et al, 1994.

(GEN) Mast Cell Tumors

GEN

Mast cell tumors are cancers of the mast cell, a connective tissue cell present in and underneath the skin. Mast cell tumors usually are first noticed as a mass of varying appearance on or under the skin.

Mast cell tumors can look like many other lesions; fine needle aspirate is usually diagnostic.

Treatment starts with surgical removal of the mass. In many cases, this is curative. However, mast cell tumors have unpredictable behavior and may quickly spread to skin and other organ systems. An aggressive mast cell tumor can be treated with chemotherapy or radiation.

Mode of Inheritance: Polygenic in BMD.

(IMM) IMMUNOPATHOLOGICAL MECHANISMS

IMM

(IMM Type I) = Involving Anaphylactic Reactions

Atopic Dermatitis

Atopic dermatitis is an inflammation of the skin secondary to an allergic response to inhaled allergens present in the environment. Typical allergens are dander, pollens, house dust and molds.

The main clinical sign is itching, shown by licking and chewing of the feet, groin, face and ears. Additional signs are reversed sneezing, discoloration of the coat secondary to itching, reddening of the eyes, papules and hair loss.

Diagnosis is by clinical signs, ruling out other skin diseases, and intradermal skin testing.

Treatment: The most desirable treatment is to avoid the allergen, but if this is not possible, antihistamines, shampoos or corticosteroids are often effective. Desensitization may help but requires a long course of treatment.

Mode of Inheritance: Unknown. Inherited in many breeds.

(IMM Type II) = Involving Cytotoxic Antibodies

(IMM) Autoimmune Hemolytic Anemia (AIHA)

AIHA is one of the two most common forms of type II reactions, along with thrombocytopenia. AIHA also occurs in dogs as part of the uncommon syndrome of canine systemic lupus erythematosus along with thrombocytopenia and rheumatoid arthritis.

Treatment: The periacute form of AIHA has a poor prognosis even with prompt and vigorous therapy. Acute and chronic forms may respond if supportive nursing care can be maintained for as long as two weeks. More often than not, the triggering cause is not known. Corticosteroids and immunosuppressive agents are used in treatment.

Mode of Inheritance: Unknown.

(IMM Type III) = Involving Immune Complexes

(IMM) Systemic Lupus Erythematosus (SLE) is a combination of types II and III diseases.

IMM

It has two immunological features: immune complex disease and a heightened antibody responsiveness with a tendency to produce autoantibodies. Diagnosis should be based on the entire clinical syndrome and not solely the presence of blood ANA (antinuclear antibody).

Treatment: Usually can be treated with glucocorticosteroids. In humans, SLE has been linked with the occurrence of cancer.

Mode of Inheritance: Unknown.

(IMM) Glomerulonephritis: (kidney)

Age at onset is from 3 to 7 years of age. Produces persistent proteinuria in nonspecific urine sedimentation tests. Unfortunately, it is only after the disease has reached advanced stages and tissue changes have occurred that the dog's owner will see symptoms. Protein/creatinine ratio is the best simple screening test even before symptoms appear, as early 1 to 2 years of age. A radioisotope clearance leads to a quick and accurate diagnosis of glomerular function. Histopathology (tissue evaluation) confirms the cause of the kidney dysfunction.

Treatment: By the time symptoms appear, there is no treatment to replace the destroyed glomerulae. If the disease is diagnosed by early screening, a dietary control appears to be feasible.

Mode of inheritance: Polygenic appears most likely.

Reference: Preiss, Heinrich, Glomerulonephritis In the Bernese Mtn. Dog, Dissertation at U. Zurich School of Veterinary Medicine, 1991.

(IMM) Necrotizing Vasculitis (Immune mediated Meningitis)

Fever, stiff gait, and cervical pain will typically be described at 4 to 6 months of age. Diagnosis may be made on observation of symptoms and their remission upon the administration of corticosteroids.

Treatment: Corticosteroid treatment reverses symptoms of pain within 24 hours. Long-term treatment with a special protocol may be discontinued when symptoms do not recur.

Mode of Inheritance: Unknown. Before his death in 1992, J. Presthus was reviewing breeding records of the disease in Berners in Norway.

(MUS) Musculoskeletal System

MUS

(MUS) Cleft Palate

The palate (roof of the mouth) separates the nasal and oral cavities. It has two parts, the hard and the soft palate. The hard palate in the front part of the roof of the mouth is formed by two bony plates, one on each side, that normally fuse at the midline during fetal development. The soft palate at the rear of the roof of the mouth is basically muscle. Both palates are covered by a mucous membrane. The cleft palate of the type seen in Berners is formed when the two bony plates of the hard palate fail to fuse normally in the fetus. This failure of fusion leaves a hole or slit in the roof of the mouth, allowing communication between the nasal and oral cavities. The slit can vary in both length and width from a very small hole to a cleft that involves nearly the entire roof of the mouth. Portions of the soft palate may or may not be involved, and a cleft lip can occasionally occur with the cleft palate. The disorder is present at birth. The diagnosis can usually be made by simply observing the roof of the mouth after the animal is born or is often made when milk is seen running from a puppy's nose while it is nursing. With a very small cleft, a radiograph may be helpful.

In most cases the puppies do not survive. They have difficulty sucking and when the milk enters the nasal passages it may be inhaled to the bronchial passages. If the cleft is shaped so that the puppy survives, a few are able to reach adulthood if they can swallow solid food.

Treatment: The only treatment is surgical closure of the cleft by covering the hole with tissue from the surrounding mucous membrane.

Mode of Inheritance: Breeding studies have shown that the trait is polygenic. Cleft palates in Berners should be considered genetic unless proved otherwise. As recently as 1971, a picture of a Berner with a 'split nose' was shown with the explanation that these dogs had extra value as guard dogs because they looked more ferocious. Cleft palate has been observed in nearly all breeds of dogs.

(MUS) Cruciate Ligament Rupture

The dog will rather suddenly favor one rear leg, even to the extent of becoming three-legged; usually with normal use of the leg, soon becoming a constant limp. Often reported as following a sudden rotation or hyperextension of the stifle (described as 'jumping like a deer'). Clinical manipulation of the stifle joint will reveal instability that results in progressive degeneration. The rupture of the cruciate in one leg significantly increases the risk that it will happen in the other leg.

Treatment: Surgical repair.

Mode of Inheritance: Unknown.

(MUS) Osteochondritis Dissecans (OCD) of Shoulders, Stifles (knees), Tarsi(hocks) joints

OCD is due to aseptic necrosis of subchondral bone and may involve the separation of the articular cartilage from the underlying epiphyseal bone. The disease occurs during maximal growth when the biomechanical stresses are greatest in the immature skeleton (4 to 8 months in dogs). Most cases will not be revealed in an x-ray, but can only be seen at the time of surgery or necropsy.

Treatment: Most animals recover spontaneously. However, loose joint bodies should be removed and the bone lesion curetted.

Mode of Inheritance: Unknown

(MUS) Patellar Luxation ('kneecap' in the stifle joint), also called genu valgum

The kneecap does not stay in the trochlear ridges with the result that the stifle and hock may be markedly flexed. The dog may have difficulty rising and bearing weight on the affected leg. Joint degeneration is progressive. Palpation of the luxating patella is usually adequate for diagnosis.

Treatment: Surgery to keep the patella in place may be successful in selected cases.

Mode of Inheritance: Recessive in Poodles, polygenic in Bull Terriers. Heritable in toy and miniature breeds.

(MUS) Elbow Dysplasia (ED)

Arthrosis Includes the body's reaction to a joint which does not fit properly and may cause Fragmented Coronoid Process (FCP), Osteochondritis Dissecans (OCD), or Ununited Anconeal Process (UAP).

Commonly, only an odd gait is noted clinically, since the disease is primarily bilateral, although some cases will have foreleg lameness. The coronoid fracturing occurs during the fastest growth period, most commonly between 4 to 6 months of age. If the anconeal process has had pressure on it during the time in which it normally unites with the ulna, it may remain as an ununited piece of bone. With these young cases, OCD may or may not be observed in the area of the FCP or UAP lesion. By one year old, arthrosis will become visible in the elbows with any of these three elbow conditions. The degree of arthrosis will increase as time goes on. Arthrosis can be diagnosed in most cases by x-raying at 12 months of age. The degree of arthrosis present will depend upon the extent of the abnormalities caused by abnormal fit (incongruity) of the bones in the elbow joint. Some of the abnormalities which will cause arthrosis, such as OCD or a slight fracture of the coronoid, may not be visible on a radiograph and can only be seen when the joint is surgically opened.

(Elbow Dysplasia - continued)

Treatment: There is no procedure at this time that can make a stable joint out of one that has incongruity causing these abnormalities, though it is generally confirmed by owners that dogs are more comfortable after a fragment is removed surgically.

Mode of Inheritance: Padgett reports a polygenic mode for FCP and OCD in Labs in 1995. Simple recessive for FCP was ruled out with a planned breeding of two affected BMD for the study by Wind in 1982.

(MUS) Hip Dysplasia (HD)

Hip dysplasia is a widespread degenerative disease of the hip joint. It involves the improper fit of the head of the femur into the hip joint socket (acetabulum) of the pelvis. Because of the ill-fitting hip joint, secondary osteoarthritic changes occur and the disease becomes progressively more severe as the animal ages.

Although the dog may not show clinical lameness while it is young, lameness and pain with difficulty in rising and in running generally develop as the animal matures. If severe, the disease may start as early as 3 to 4 months of age, and in all but a small percent of the cases it occurs by one year of age.

Radiographic evaluation of the hip joints has been accepted worldwide as the diagnostic method of choice. Palpation of the hip joint has also been used as a diagnostic technique for HD, but three separate studies have shown it to be less accurate than a radiograph at 12 months of age for diagnosing the disorder.

A new method of screening for HD being advertised is called PennHip (tm). This "compression/distraction stress radiographic technique" is reported to diagnose more hip disease and at under 12 months of age than standard "hip extended" positions. Dr. Gail K. Smith at the University of Pennsylvania is gathering data from a network of sites at this time (6/95). Those data are not available as a public registry. The GDC is not prepared to consider PennHip evaluations for registry until such time as they release full information on both affected and unaffected diagnoses for open retrieval.

Treatment: No treatment has clearly been shown to stop progression of the disease. In the past, cutting the pectineus muscle, diet, limited exercise and vitamin C were said to prevent or decrease the severity of the disease, but none has been shown to do so in nonexperimental situations. Medication may be useful during periods of acute pain.

Early pelvic osteotomy shows promise of minimizing progressive arthrosis. Total hip joint replacement will decrease pain and increase function in severe cases.

Mode of Inheritance: Polygenic. HD occurs in more than 100 breeds.

Reference: What Do We Know About Hip Dysplasia Today?, Lennart Swenson, paper presented in Geilo, Norway 5/87

MUS

(MUS) Tails (abnormal, kinks or very short)

Some Berners are born with variations which are seen regularly in the related Sennenhund breeds, such as the bob-tail of the Entlebucher or the curled tail of the Appenzeller and moderate variations between these. A triangle shaped vertebrae has been seen radiographically at the site of the bend in the tail that did not hang straight and at the end of the tail that had a palpable crook at the end. This can be a concern in the competitive conformation show ring.

Treatment: There is seldom medical reason for altering these tail anomalies.

Mode of Inheritance: Unknown.

(NER) NERVOUS SYSTEM

NER

Cerebellar Cortical Abiotrophy

Premature death of Purkinje nerve cells of the cerebellum cause this debilitating neurological disease.

Clinical signs, beginning at 2 to 3 months include wobbliness and tremors that can progress to disability severe enough to require euthanasia.

There is no treatment.

Mode of inheritance: Autosomal recessive in Kerry Blue Terriers, Gordon Setters and Rough Coated Collies.

(NER) Epilepsy Idiopathic (seizures without a primary cause): Psychomotor and Motor

Symptoms are most commonly noted at maturity (approximately age 2 for BMD). Mild cases may go undetected while severe cases can affect the general well-being of the dog. Diagnosis is aided by observation and documentation of seizures by video-recording. EEG if a seizure is recorded, remission of symptoms with administration of appropriate drugs.

Treatment: Anticonvulsant drugs are given in small doses that do not alter the general behavior. In some cases, the level of the drug has to be so high to prevent the symptoms that the general behavior will be altered.

Mode of Inheritance: Unknown.

Psychomotor Seizures

These seizures appear as hallucination of any of the senses and in a wide range of severity. The most severe that have been described appeared as 20-30 minute intervals more than once a day when the dog was preoccupied with snapping at imaginary something in the air (visual stimulation); jumping up and looking back to where it had been in contact with the ground as if something had bitten (tactile stimulation); suddenly appearing to track something on the ground (scent stimulation); tonguing and gagging as if to remove something from the mouth (tactile or taste stimulation); alerting as if to sounds, which the people could not hear; may not exhibit symptoms daily, and may only be short sessions of several snaps at what appear to be imaginary flies. In these cases, when the behavior is understood, the dog and owner can ignore it, but in the more pronounced cases the dog shows varying degrees of anxiety behavior, including apparently associated weight loss. The owner finds it difficult to watch. The dog's attention can be attracted during any of these episodes.

(NER) Epilepsy Idiopathic - continued

Motor Seizures

These seizures have the more recognizable symptoms from mild momentary loss of attention to the extreme of minutes of unconsciousness which may include convulsions.

Reference: Inheritance and Idiopathic Canine Epilepsy, J.G. Cunningham & G.C. Farnbach, JAHA 2/87 Epilepsy in Labradors, T. Holliday, Lab Specialty presentation, 1991. Merck Manual, pg. 583, 'Fly-catching' in King Charles Spaniels.

(NER) Hypomyelination (Trembler)

A hypomyelinating condition (trembler), in the BMD is manifested clinically as a tremor of the limbs and head which becomes more intense with excitement or stress and which disappears with sleep. The tremor, which is first noticeable between 2 and 8 weeks old, may persist throughout life but decline with age. This disease has been reported only in England and only in pedigrees descending from Duntiblae Nalle, whelped in Sweden, who was not affected clinically. Examination of plastic embedded tissue obtained post mortem from two 9 week old animals showed hypomyelination of the spinal cord.

There is no known treatment.

Mode of Inheritance: Preliminary examination of breeding data suggests that the condition may be inherited as an autosomal recessive gene.

Reference: Recognition of 'trembler', a hypomyelinating condition in the BMD, A.C. Palmer, W.F. Blackmore, M.E. Wallace, etc., Vet. Record, 6/27/87

(SKN) SKIN

SKN

Atopic Dermatitis

Atopic dermatitis is an inflammation of the skin secondary to an allergic response to inhaled allergens present in the environment. Typical allergens are dander, pollens, house dust, and molds.

The main clinical sign is itching, shown by licking and chewing of the feet, groin, face, and ears. Additional signs are reversed sneezing, discoloration of the coat secondary to itching, reddening of the eyes, papules, and hair loss.

Diagnosis is by clinical signs, ruling out other skin diseases, and intradermal skin testing.

The most desirable treatment is to avoid the allergen, but if this is not possible, antihistamines, shampoos or corticosteroids are often effective. Desensitization may help but requires a long course of treatment.

INTERNATIONAL BMD DATABASE

LITTER FORM 11/90

BIRTHDATE _____
 KEN'L NAME _____
 BREEDER _____
 NATURAL BIRTH _____ C-SECTION _____

LITTER REG. # _____
 SIRE NAME _____
 DAM NAME _____

SEX ↓	PUPPY NAMES & REG. NUMBER (include stillborn & died) ↓ if available.	BUYER NAME/ADDRESS/PHONE ↓ Please Print
M F N	1. NOTES:	1.
M F N	2. NOTES:	2.
M F N	3. NOTES:	3.
M F N	4. NOTES:	4.
M F N	5. NOTES:	5.
M F N	6. NOTES:	6.
M F N	7. NOTES:	7.
M F N	8. NOTES:	8.
M F N	9. NOTES:	9.
M F N	10. NOTES:	10.
M F N	11. NOTES:	11.
M F N	12. NOTES:	12.
M F N	13.	13.

INTERNATIONAL BMD DATABASE

PEOPLE FILE contains***

LAST NAME OF OWNER where dog lives _____ CO-OWNER, if any _____
 FIRST NAME _____ SPOUSE _____
 STREET _____ TOWN _____ STATE _____
 ZIP _____ COUNTRY _____ PHONE ____/____-____

DOG FILE contains***

DOG'S REGISTERED NAME _____
 LITTER # _____ CALL NAME _____
 BIRTHDATE _____ DEATHDATE _____ SEX: M N/S F
 REG. # _____ TITLES _____ TATTOO _____
 BREEDER'S NAME _____
 BREEDER'S KENNEL NAME _____

SIRE'S REGISTERED NAME _____ Reg. # if known: _____
 CALL NAME _____
 DAM'S REGISTERED NAME _____ Reg. # if known: _____
 CALL NAME _____

PHENOTYPE FILE contains ***

PHYSICAL CHARACTERISTICS that you wish to record: (i.e. ht., wt., eye color, bite, cleft palate, umbilical hernia, etc): on back of sheet--

RESULTS from GENETIC DISEASE HEALTH REGISTRIES: (submit copies of existing reports or ask Berner-Garde how to get application forms)

GDC: Open format with access to affected as well as normal evaluations; both orthopedic and soft tissue genetic diseases of many breeds; set up to evaluate genotype as well as phenotype.

OFA: Confidential format with access only to normal evaluations; registries for hips and elbows; set up to evaluate phenotype only.

CERF: Confidential format with no access to abnormal evaluations; registry for eye diseases; set up to evaluate phenotype only.

BMD TUMOR STUDY (in process 1989-?): All data entered as open, from owner, to be released at time of publication of study results.

IF DEAD, is CAUSE known?: _____

EUTHANASIA? ____yes ____no

I voluntarily submit the above data for entry and release to persons working to control genetic disease.

Signature _____ Date: _____

GDC**Open
Registry**Institute for
Genetic Disease Control
In AnimalsNonprofit & Tax-exempt
P.O. Box 222, Davis, CA 95617
Phone & FAX: 916/756-6773For GDC use:
Ck. No.
Dog No.
A:
E:**Application
for Histopathologic Evaluation and Registration
of Tumors in Bernese Mountain Dogs****For OWNER/AGENT to fill out and sign:**Owner name _____ Co-owner _____
Street _____ City _____ State _____ Zip _____ Ph _____ / _____
Breed _____ Sex: M _____ (N/S _____) F _____ Weight _____ Height _____
Reg. name of dog _____ Call name _____ Birth _____
Give Dog's GDC number if previously registered _____ Reg.no. (AKC, other) _____

IF DOG HAS NOT BEEN REGISTERED BEFORE WITH GDC, Please send a 4-generation pedigree & FILL IN THIS ADDITIONAL DATA:

Litter reg. no. _____ Number & sex in litter _____
Breeder _____ Address _____
Sire's reg. name _____ Birth _____ Reg. no. _____
Owner of sire _____ Address _____
Dam's reg. name _____ Birth _____ Reg. no. _____
Owner of dam _____ Address _____**OWNER:** I hereby certify that the tissue sample submitted is of the dog described on this application.
I understand that the material submitted from my dog will receive a histopathologic diagnosis that will be available to my veterinarian and me.
I understand that the diagnosis and other information on this sheet will be retained in the GDC open Tumor Registry and Research Database.
I authorize the GDC to release this data to responsible breeders, owners, prospective owners and investigators.

Signature of owner/authorized agent _____ Date _____

**For VETERINARIAN WHO OBTAINS THE TISSUE SAMPLE to fill out:**

DOG IDENTIFIED BY: Tattoo* _____ Coat marking _____ Owner's statement _____ Other _____

DATE SPECIMEN TAKEN: _____ 19__.

Biopsy _____ or necropsy _____ Location of sample(s) _____

Comments _____

CLINIC/HOSPITAL _____ Phone _____ / _____ FAX _____ / _____

Please print name of Veterinarian on this line _____

Street _____ City _____ State _____ Zip _____

Signature of Veterinarian _____ Date _____

For PATHOLOGIST WHO PROCESSES AND EVALUATES THE SPECIMEN to fill out (attach full report for file) :

Date specimen received _____ 19__.

PATHOLOGICAL DIAGNOSIS for database entry: _____

COMMENTS _____

Signature of Pathologist _____ Date _____

Address: _____

See back of page for instructions and fees.

Instructions

- » **For the Veterinarian Who obtains the Biopsy or Necropsy sample** and mails it in neutral buffered formalin to a Board Certified Pathologist for diagnosis with:
1. a GDC application form signed by owner and veterinarian who obtains the sample;
 2. the tissue sample, marked to identify the tissue and the dog,
 3. a \$35 check written to organization where histopathological diagnosis will be made.

- » **For the Pathologist who receives, processes, diagnoses the tissue sample,** forwarding to the GDC:
1. this GDC application form with  **terminology for data entry** added on the front side and signed by pathologist, with attached histopathological report;
[include both those neoplastic growths that are benign or malignant (other lesions such as granulomas or cysts are not registerable)]
 2. a slide for archiving.

The GDC will place the histiocytosis and mastocytoma cases in a Registry for diseases that have been reported as inherited. Lymphosarcoma and fibrosarcoma are reported as not inherited.

All other tumor types will be placed in a Research Database until such time as a review of the data shows they may be inherited in the BMD.

The GDC will archive the slides used for diagnosis at a single site which is agreed upon by the BMDCA and the GDC. Initially this will be with Dr. Bruce Madewell at UC Davis where they will be added to the existing collection which is a part of the on-going study that was initiated in 1989.

Fee for this application requires one check, payable to one of the UNDERLINED ORGANIZATIONS, below, where the cooperating Board Certified Pathologist is housed:

_____ \$35 to process and evaluate the biopsy or necropsy tissue.

The BMD Club of America has agreed to support the use of this open registry by payment directly to the GDC for each case entered: \$14 for tumor registration of this dog by GDC if dog has no previous registration with GDC or \$10 for tumor registration of this dog if previously registered by GDC in another of their disease Registries.

A list of ACVP certified pathologists who are cooperating can be requested from the GDC.

Initially, the following labs are qualified and have agreed to handle the extra mailing of the GDC Application form and the slide for the archives to the GDC.

Regents of Univ. of Calif. at Davis
c/o Dr. Bruce Madewell
Dep't. of Vet. Surg. & Rad. Sciences (for GDC/BMD)
Room 2112, Building MS1A
Davis, CA 95616

MSU College of Vet. Med.
Animal Health Diag. Lab
(for GDC/BMD)
PO Box 30076
Lansing, MI 48909
Ph: 517/353-5275

Only for Dr. Pamela Ginn
(for GDC/BMD)
University of Florida
PO Box 100103
Gainesville, FL 32610-0103
Ph: 904/392-4700

C V Diagnostics
c/o Dr. R. Culbertson
(for GDC/BMD)
PO Box V
3911 W Capitol Ave.
W Sacramento, CA 95691
Ph: 800/444-4210

Ph: 916/752-3599

GDCOpen
RegistryInstitute for
Genetic Disease Control
In AnimalsNonprofit & Tax-exempt
P.O. Box 222, Davis, CA 95617
Phone & FAX: 916/756-6773For GDC use:
Ck. No.
Dog No.
A:
E:**Application**

for RADIOGRAPHIC EVALUATION and REGISTRATION

94....

For OWNER/AGENT to fill out:

Owner Name _____ Co-owner _____
 Address _____ City _____ State _____ Zip _____
 Phone _____/_____
 Breed _____ Sex: M _____ (____N/S____) F _____ Weight _____ Height _____
 Registered name of dog _____ Call Name _____
 Birth _____ Reg.no. (AKC, other) _____ No. dogs in litter _____
 Sire's reg. name _____ Reg. no. _____
 Dam's reg. name _____ Reg. no. _____

For VETERINARIAN to fill out:

IDENTIFICATION: Tattoo* _____ Microchip* _____ Coat marking _____ Owner's statement _____ Other _____

<u>SITE(S) To Be Evaluated</u>	<u>DATE-RADIOGRAPH(S)</u>	<u>CLINICAL STATUS</u>	<u>TYPE OF RESTRAINT used:</u>
Pelvis: Hip dysplasia _____	_____	No clinical signs _____	Physical, only _____
Legg-Perthes _____	_____	Abnormal gait _____	Sedative type _____
Stifles _____	_____	Lame _____	General anesthetic type _____
Elbows _____	_____	Can the patella be luxated? R _____ L _____	
Shoulders _____	_____	Other comments _____	
Hocks _____	_____		
Skull _____	_____		

CLINIC/HOSPITAL _____ Phone _____ FAX _____
 Address _____ City _____ State _____ Zip _____
 Signature of Veterinarian _____ Date _____
 Please print name on this line _____

For OWNER/AGENT to fill out:

(A refund will be issued for any evaluations showing known or suspected genetic disease. In this event, I prefer to receive a refund check _____ donate it to the GDC _____).

FEES FOR THIS APPLICATION: See back of page →

- _____ \$20 for entering a dog in the Registry & evaluation & Certification of one normal site (see appropriate GDC instruction card for breeds with specific databases).
 _____ \$5 for each additional site evaluation requested at the same time; \$10 for additional site submitted separately.
 _____ \$50 maximum, for litter package of _____ siblings submitted together (No refunds for affected sites).
 _____ \$2 for FAX report.

\$_____ Total chargesI enclose a check for this amount.

- OWNER:
- I hereby certify that the radiograph submitted is of the dog described on this application.
 - I am aware that the radiograph will be retained for the records of the Institute for Genetic Disease Control in Animals.
 - I authorize the GDC to release the radiographic evaluation to my breed club, responsible breeders, owners, prospective owners and investigators.

Signature of owner or authorized agent _____ Date _____

INSTRUCTIONS to the VETERINARIAN for submitting films to the GDC

IDENTIFICATION: Ideally, all animals are identified permanently on their body, otherwise please state method of identification. The submitted film will be identified permanently with the veterinarian's or hospital's name, date, dog's name, registration number, age, breed, and owner's name.

MUSCULOSKELETAL DISEASE REGISTRIES & RESEARCH DATABASES: Currently, there are Registries for hereditary dysplasia, osteochondrosis & arthrosis of the hips, elbows, shoulders, hocks of all breeds; for Legg-Perthes, craniomandibular osteopathy & medial patellar luxation in Cairns. There are Research Databases for epilepsy in Labradors and dwarfism in Pyrenees.

AGE: The GDC will certify normalcy at a minimum age of 12 months for the above diseases listed in Registries; will register affected evaluations without charge at the age of detection.

POSITION: **PELVIS for HIPS (HD or L-P) & STIFLES:** Use grid technique for all dogs **HIPS/STIFLES**

over 11cm (4"). Submit a standard ventrodorsal view with rear legs extended and parallel to each other. The area must include both the sacrum and the stifles.

ELBOWS: A table top, no-grid technique should be used. **Submit both** fully flexed and neutral lateral views of both elbows.

SHOULDERS: Submit a lateral view of **both** shoulders with the legs extended.

HOCKS: Use table top technique. **Submit both** a normal flexed lateral and an AP (dorsoplantar) or PA (plantodorsal) view of each hock.

SKULL: Submit a lateral view as well as left and right oblique positions.

RESTRAINT:

Proper positioning of the hips may be difficult to obtain without chemical restraint.

Except for the hips, the degree of relaxation does not affect the evaluations of the other diseases.

REPORTS: Written criteria for evaluating the radiographs is included on the evaluation sheet.

All Veterinarians who evaluate for the GDC have acknowledged these criteria and their findings are recorded in the computer. Since our system is totally computerized, you can expect your printout to be mailed within thirty (30) days from date of receipt of the radiographs.

APPLICATION FOR EVALUATION & REGISTRATION: The owner or agent will complete the signed application form on other side of page for each dog and mail it with the radiograph(s) to the GDC, Box 222, Davis, CA 95617.

A NUMBER of GDC SERVICES: Services, such as sibling and progeny printouts (to the extent they have been submitted) are available for breeders selecting to improve genetic health.

NORMAL CERTIFICATION NUMBER, for example, GDC 678 (H or E or S, etc.) 12 N 10/94

The first number is the dog's GDC record number (it is unique to that animal, independent of the breed); the next letter describes the anatomical site followed by a secondary disease identifier; the age in months is the next set of numbers; the last letter certifies that the quality of that site is within Normal limits (grade of E, G, or A is added for hip dysplasia); the last numbers give date of expiration in the case of some diseases. The different sites are tied together with the same dog number to facilitate retrieval from the file of all evaluations on that dog.

*****GDC Price List *****

CHARGES for INDIVIDUAL DOG(S):

--\$20 for entering a dog in the Registry & evaluation & Certification of one normal site (see appropriate GDC instruction card for breeds with specific databases);

--Each additional site evaluation requested is \$5 each, if submitted at the same time; \$10 ea. if submitted separately; \$25 if 2 normal sites are submitted, \$30 if 3 normal sites are submitted; \$35 for 4 normal sites, etc.;

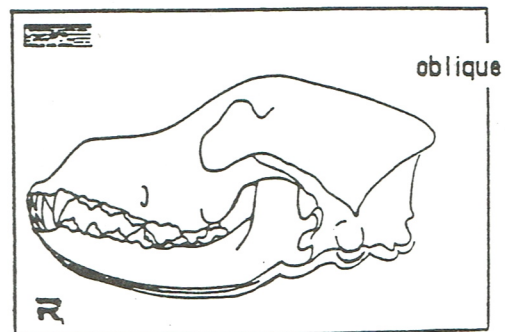
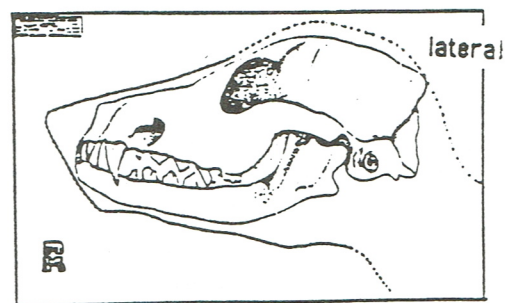
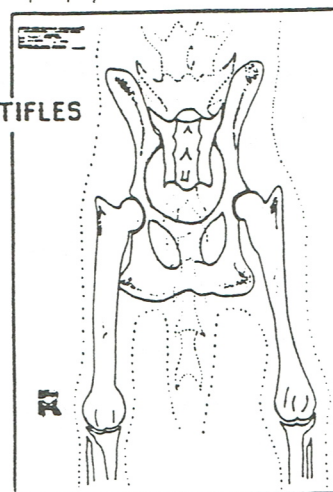
--The charge for each site that is affected will be refunded.

--FAX service for receiving evaluation reports is \$2.00.

--SPECIAL CHARGE PACKAGE for LITTERS:

A maximum \$50.00 package can be requested by a breeder desiring radiographic evaluation of one or more anatomic sites for dogs in the same litter. The breeder will arrange for the collection of the radiographs of the members of the litter, mail them to the GDC in a single envelope, and include an application form for each dog. This is a one time fee and cannot be extended to individuals of a litter that are submitted separately or at different times.

With this special price there are no refunds for evaluation and registering of affected sites.



REPORTS of OTHER RECOGNIZED ORGANIZATIONS may be registered with the GDC under some circumstances. Please inquire.



Institute for
Genetic Disease Control
in Animals

Institute for
Genetic Disease Control
in Animals

PO Box 222, Davis, CA 95617
Phone & FAX 916/756-6773

INFORMATION ON EVERY DOG IS IMPORTANT

When there is data on a sufficiently large size family of dogs, a breeder can evaluate the risk for genetic disease transmission of dogs in that family.

The evaluations of every single dog, whether pet or working dog, become an important data source to increase the accuracy of the predicted risk in a relative being considered for breeding.

ACCESS TO THE OPEN REGISTRY

In general, data in the GDC Registry is available (for a fee) to people who need support and information which will lead to a reduction of genetic diseases in a kennel or the breed. All information must be used in accord with ethical breeding standards. All requests for information will be maintained in the file.

Examples of GDC Registry use include:

- A person (owner of either a male or a female animal) may ask for the evaluations of a disease in the siblings and halfsibs of their dog and of a particular dog to be considered as a mate. They may ask for the same records on any progeny produced by their dog.
- A researcher might propose a formal study of the data on one of the diseases, the method of diagnosis, the mode of inheritance, etc., with the expectation of publication.

VERIFICATION OF ACCURACY

An owner may request the GDC records on their own dog(s) at any time in order to verify the accuracy of that information.

Open Registry of Hereditary

Eye Disease

A New Tool to use in the fight against

inherited eye disease in all pure-bred canines.

The owners of pure-bred dogs may now choose to place the evaluation* of their dog's eyes in an open registry where it will be linked to other members of that dog's family. This information will identify carriers of inherited eye defects among the unaffected animals.**

In response to a formal request from the Poodle Club of America and with the cooperation of several organizations, the GDC is registering evaluations for inherited eye disease. Research Databases are established for breeds which have not yet proven inheritance.

- The Canine Eye Registration Foundation (CERF) is not associated with GDC. It will continue to operate as a protected registry by releasing data on normal animals only. Ophthalmic disease data gathered during CERF exams is only released as pooled information and no diseased animal is ever identified. The pooled data provides information on the prevalence of ophthalmic diseases by breed, age, sex, etc.
- The new (GDC) Open Registry will file data for owners who wish to openly share the phenotypic evaluation of their dog, regardless of the diagnosis. The data can be used as the tool to determine genotypic risk factors (including carrier status) of an individual animal by linking to all relatives** that are submitted to the GDC Open Registry.

* A single evaluation determines only the status of that individual (its phenotype).

** To determine a genotype, the phenotypes of relatives must be linked together.

GDC EYE REGISTRY Application Form

PLEASE PRINT Ophthalmologist name _____
BREED _____ SEX _____

>ANIMAL REG. NAME _____
Call Name _____ No. in LITTER _____
KC REG. No. _____ Birth _____

Owner name _____
Address _____

Phone _____

NAME OF BREEDER _____

Address _____

Sire Reg NAME _____
Sire Reg. no. _____

Dam Reg. NAME _____
Dam Reg. no. _____

Include Fee, payable to GDC: _____

xxxxx NO CHARGE FOR AFFECTED Entries.

Owner sign this release: I hereby certify that the data submitted is of the dog described on this application. I am aware that the data will be public information and will be maintained for the purpose of improving the breed and lowering the risk of genetic disease, as well as for research purposes.

Signature of owner/authorized agent _____
Date _____

WHAT IS AN OPEN DISEASE REGISTRY? **A DATABASE OF GENETIC HISTORY**

An open disease registry is a data bank of genetic history for any breed of dog. In an open registry like the one maintained by GDC (Institute for Genetic Disease Control in Animals), owners (potential breeders), veterinarians and scientists can trace the genetic history of any particular dog.

In order to control the increasing prevalence of genetic diseases (such as those of the hip, elbow, shoulder, eye, skin, heart), we must know how prevalent such diseases are in the breed and in any particular dog's bloodlines.

The information about each dog automatically becomes linked in the open registry with relatives of that animal. An open registry delivers this information to breeders for the selection of mates whose bloodlines indicate a reduced risk of producing genetic disease.

REGISTERING BOTH AFFECTED DOGS AND THOSE THAT APPEAR NORMAL

The purpose of the open registry is to help breeders and owners reduce the prevalence of genetic diseases in their breeds. In order to be effective, the registry must record data on as large a group of animals as possible, especially the affected.

Each owner of a registrant in an open registry has agreed to the release of the data whether the evaluation of the animal is affected or not. Each dog registered in an open registry brings crucial information to help support the improvement of the entire breed.

For Application to the GDC Open Registry, the owner will fill out the form from the following center section and submit to the GDC along with the original (or a copy of both sides) of the ophthalmologist's evaluation (white owner's form).

[ADDRESS ON BACK] ➡

When appropriate, the GDC issues a Certificate of unaffected (valid for 1 year). Otherwise the affected diagnosis is registered and the check is returned to the owner with the notice of registration.

The Open Eye Registry will be maintained in a breed specific manner, depending on the diseases found in each breed and the requests of the sponsoring breed club.

**It is the desire of the cooperating organizations
to give the public two clear choices
with as little confusion as possible.**

(THE GDC WILL WELCOME COMMENTS FOR IMPROVEMENT.)

Fees:
xxxxx NO CHARGE FOR AFFECTED Entries.

US \$10 for first unaffected Certification.
(Valid for 1 yr. only, since symptoms may occur at any time.)
\$5 for later unaffected Certification.

US \$20 when 5 or more LITTERMATES, or related dogs, are submitted at same time (no refund for affected).

The GDC will register CERF evaluations that are accompanied by this Application Form and:
US \$10 if this is first GDC entry for the dog.
US \$5 if dog is already registered with GDC.

Why Confidential Registry Forms Are Not Included

Orthopedic Foundation For Animals (OFA) and Canine Eye Registration Foundation (CERF) forms are not included in this booklet since these registries are confidential and do not publicly identify a dog with an affected evaluation nor do they identify any dog by its parentage. They are phenotype evaluation services and are of limited help in predicting genotype. Using the system of breeding normal phenotype to normal phenotype without knowledge of the phenotypes of relatives is called "mass selection".

If a dog has a polygenic disease, "mass selection" by the individual animal breeders will produce only slow improvement in the breed as a whole. This includes diseases like hip and elbow dysplasia. It is even less likely to improve the simple recessive diseases like progressive retinal atrophy (PRA). The presence of even one affected sib or aunt/uncle can be used to predict the risk that the genotype of this dog will reproduce PRA or the hidden carrier gene in its offspring.

With simple recessive traits, phenotype does not predict genotype unless the animal is affected. Control of genetic disease depends upon offspring (progeny) evaluation and knowing where both normal and affected individuals occur in the extended family.

Establishing the average level of occurrence of a disease in a breed depends upon knowing both the normal and the affected individuals. It is important to know that the figures that are being published by the OFA regarding the percentage of dysplasia in a breed are not valid for the breed as a whole. They are the percentage of cases submitted to OFA and have already been mostly screened to be those that owners expect to be normal. The actual percentage of the disease in a breed must be assumed to be much higher. These figures should not be compared with reports from foreign registries that have open knowledge of all evaluations, normal and affected.

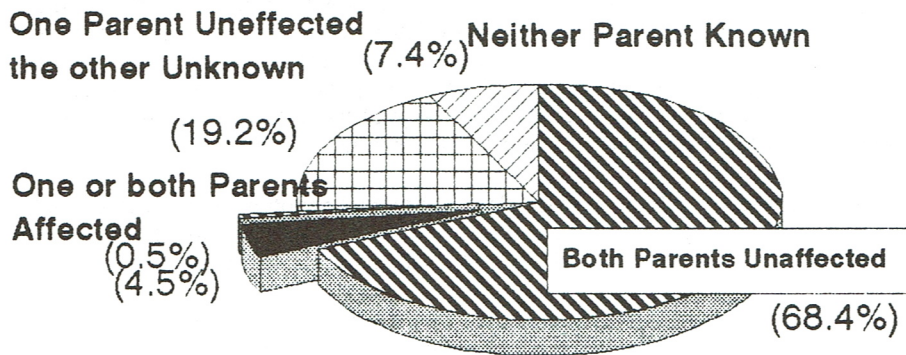
There are three confirmed cases of PRA submitted to the BMD database by the owners, but we have no idea of whether CERF has recorded more than that or where the carrier animals are at this time.

The graph on the following page shows data from the BMD database that reveals a high (70%) of breeders cooperating in the last 20 years to use the OFA normals for breeding by the "mass selection" choice of normal to normal animals. Still, today, the figures from OFA indicate that 24% of the BMD films submitted to them are dysplastic and can not be certified normal. That 24% plus all of the abnormalities that were never registered are the missing pieces of data we need to record so as to predict the genotype of a potential breeding pair.

Berner-Garde Study

Hip Status of Parents, 1984 to 1994

1770 Litters



Assuning 50% dysplastic, 78% of litters were by Uneffec X Unaffect

lab_dta.wq2

bg_ltr94

This graph showing the results of a 20-year history in the BMD indicates a very high degree of cooperation among breeders to use OFA normal hip certifications. Approximately 70% of the 1662 litters listed in the database were produced by matings in which both parents had certified normal hip phenotypes. This "mass selection" by phenotype is based on selection of the normal individuals with very little knowledge of the evaluations of their relatives.

It is significant to look at this chart along with a published OFA report* which reveals that the OFA is still receiving approximately 25% dysplastic BMD films in the population which has already been screened to eliminate those that appear dysplastic to the local veterinarian. (* E.A. Corley; Veterinary Clinics of North America: Small Animal Practice; May 1992, pg. 586.)

Standard Reports Order Form

Standard Reports listed here are subject to change; please inquire.

Send and Make checks payable to: **BERNER-GARDE Foundation**
(charges are for postage & handling) c/o Your Site Operator

- _____ #1. (\$3.00 ea.) **7-generation working pedigree**
format: _____ 1-page condensed _____ 2-page spread
(includes database number of all dogs in pedigree to facilitate follow up
with contacts, such as for owner).
- _____ #2. (\$5.00 ea.) **7-generation pedigree with titles**
normal hip certification on parchment; (does not have database numbers)
- _____ #3. \$3.00 ea. **List of the progeny & sibs and half-sibs**
for any recorded dog (includes owners' addresses & phone numbers).
- _____ #4. (\$ 4.00 ea) **BMD Kennel Names**
(complete list, with breeder name)
- _____ #5. (\$ 3.00 ea) **BMD Kennel Names on computer disc**
(format: ____ 3.5" or ____ 5.25")
- _____ #6(\$ 3.00 ea) **Specific sorts**
For example: all dogs, just M or F in a given geographic area, or all dogs of
certain age, etc.

\$_____ Donation to **BERNER-GARDE Foundation** in memory of dog/person

ENCLOSED CHECK for total of \$_____

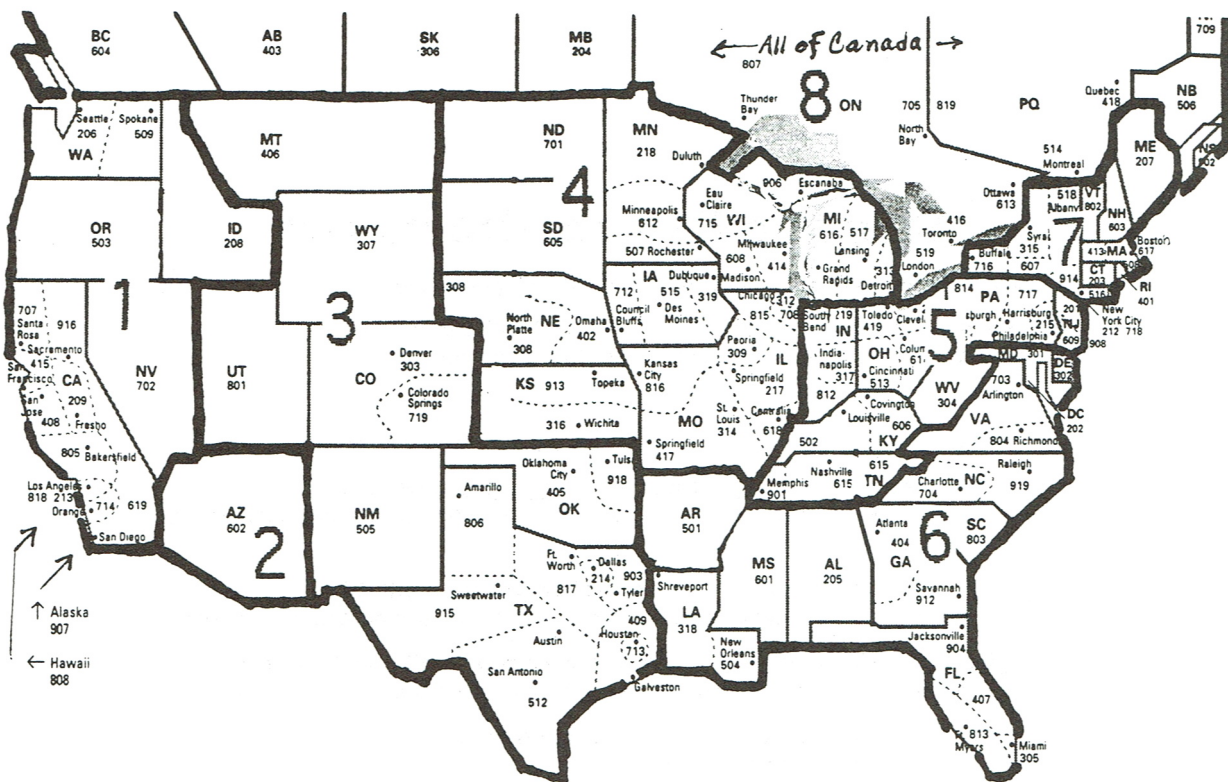
I understand that to the best of your knowledge this information is accurate. I will not hold you to any damages resulting from consequential actions. I agree to report any documented errors to you for correction. I agree that the information I receive will be for my private use to improve the genetic health of my dog and any offspring that it might produce.

Signature _____ Date _____

Street _____

City _____ State _____ Zip _____

Phone _____



This map shows 8 geographic areas for BERNER-GARDE Foundation data entry. Each has a regional site operator reporting to the master database. Each of these operators is serving not only their local club membership, but also the other regional clubs and non-affiliated owners in their defined area. When new site operators volunteer, these geographical areas are made smaller. If you prefer to submit your data to the master site, the central file manager will see that it is entered. If you have questions, feel free to call him: Martin Packard, Ph/FAX 415/941-3425, 12640 La Cresta Dr, Los Altos Hills, CA 94022. E-mail address: mpackard@mcimail.com

1 Margrit Kitchin

2783 Curlew Ct.
Pleasanton, CA 94566
510/426-6899

2 Marcia Zuger

5425 E. Grandview Rd
Scottsdale, AZ 85254
602/971-5946

3 Philip Shaffer

1501 S. Winston Dr
Golden, CO 80401
303/526-1365

4 Jack Lytle

1338 W. Park St
Arlington Hts, IL 60005-2230
708/392-2826

5 Marsha Queer

211 Spartan Dr
Monroeville, PA 15146
412/856-6938

6 Patricia Hensley

9906 Shady Slope Ct
Fairfax Station, VA 22039
703/644-6591

7 [Nashoba Valley Club]

Mary Durham 508/448-3183
Chris Cottle
74 Bayview Dr Box 126
Jamestown, RI 02835
401/423-1898

[other]
Jack Lytle (see area 4)

8 [All of Canada]

Ron Smith
Route #1, Campbellcroft, ON
Canada L0A 1B0
416/797-2373

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Off to a Good Start !



Foto, Switzerland, by Fritz Brauen

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The BERNER-GARDE Foundation, Inc.

as a Service to Owners and Dedicated Breeders for Control of Genetic Disease

IN MEMORY OF

THE BERNERS THAT HAVE BEEN SERIOUSLY AFFECTED BY GENETIC
DISEASES

20 Tynan Way, Portola Valley, CA 94028

Berner-Garde Database ER Design

